

**Notice of Allowability**

Application No.

10/084,254

Examiner

Thomas K. Pham

Applicant(s)

MACMARTIN ET AL.

Art Unit

2121

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to amendment filed 6/7/2005.
2. ☒ The allowed claim(s) is/are 1-21.
3. ☒ The drawings filed on 27 February 2002 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All b) ☐ Some\* c) ☐ None of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
  6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
    - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
    - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date \_\_\_\_\_
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date \_\_\_\_\_
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_

### EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. John Carlson on 08/11/2005.

Claims 1, 6 and 21 of the application have been amended as follow:

**Claim 1.** (Currently Amended) A method for reducing sensed physical variables including the steps of:

a) generating a plurality of control commands as a function of the sensed physical variables;

b) generating an estimate of a relationship between the sensed physical variables and the control commands, wherein the estimate is used in said step a) in generating the plurality of control commands;

c) sensing a response by the sensed physical variables to the control commands and updating the estimate of the relationship in said step b) based upon ~~a~~ the response by the sensed physical variables to the control commands, wherein the control command in said step a) includes a normalization factor on a convergence rate that depends on said estimate in step b), and wherein said normalization factor is updated based on the update to the estimate.

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**Claim 6.** (Currently Amended) A method for reducing sensed physical variables including the steps of:

a) generating a plurality of control commands as a function of the sensed physical variables based upon an estimate of a relationship between the sensed physical variables and the control commands; and

b) sensing a response by the sensed physical variables to the control commands and updating the estimate of the relationship in said step a) based upon ~~a~~the response by the sensed physical variables to the control commands by treating the updating of the estimate as a portion of a QR decomposition and solving the QR decomposition.

**Claim 21.** (Currently Amended) A method for reducing sensed physical variables including the steps of:

a) generating a matrix of sensed physical variable data ( $z_k$ );

b) generating a matrix of control command data ( $u_k$ ), wherein  $\Delta z_k = T \Delta u_k$ , and where T is a matrix representing an estimate of a relationship between the sensed physical variables and the plurality of control commands;

c) sensing a response by the sensed physical variables ( $z_k$ ) to the control command data and updating the T matrix according to  $T_{k+1} = T_k + EK^H$

where K is a gain matrix and E is residual vector formed as  $E = y - Tv$ , and where  $y_k = \Delta z_k$ , and  $v_k = \Delta u_k$ , wherein the control commands in said step b) include a normalization factor on a convergence rate that depends on the T matrix, and wherein said normalization factor is updated based on the update to the T matrix.

*Reasons for Allowance*

2. Claims 1-21 are allowed.
3. The following is an examiner's statement of reasons for allowance:

While Hodgson (U.S. Patent No. 5,526,292) discloses an active noise and vibration cancellation system with broadband control capability. A controller receives the broadband disturbance signal as well as error signals from error sensors which enhance the cancellation capability of the control signals produced by one or more actuators position within an aircraft cabin or a vehicle passenger compartment. Hodgson does not teach the control command includes a normalization factor.

Millot et al. ("Flight test of Active Gear-Mesh Noise Control on the S-76 Aircraft") discloses a description of an active noise control system architecture and control algorithms, a brief summary of the development and ground-testing of the system, a flight test set-up and procedure, and a summary of the test results demonstrating the performance and robustness of the system. Millot et al. does not teach the control algorithms includes a normalization factor.

And Taylor (U.S. Patent No. 5,834,918) discloses a self-tuning tracking controller for permanent-magnet synchronous motors providing for velocity or position trajectory tracking when both mechanical and electrical parameters are initially unknown. The system uses a robust normalized gradient update law for the linear-in-parameter inner-loop and outer-loop output equations to calculate the estimate electrical and mechanical parameters. Taylor does not disclose a control command includes a normalization factor on a convergence rate that depends on an estimate of a relationship between the sensed physical variables and the control commands, wherein the normalization factor is updated based on the update to the estimate.

None of these references taken either alone or in combination discloses a method and device for reducing sensed physical variables having all the claimed features of applicant's instant invention, specifically including: a control command includes a normalization factor on a convergence rate that depends on an estimate of a relationship between the sensed physical variables and the control commands, wherein the normalization factor is updated based on the update to the estimate. Furthermore, the system is treating the updating of the estimate as a portion of a QR decomposition and solving the QR decomposition. In addition, the update to the estimate includes updating a matrix  $T$  according to  $T_{k+1} = T_k + EK^H$ ; where  $K$  is a gain matrix and  $E$  is residual vector formed as  $E = y - Tv$ , and where  $y_k = \Delta z_k$ , and  $v_k = \Delta u_k$ ; and other limitations related to these features in combination with the remaining elements and features of the claimed invention. Also, there is no motivation to combine the references to meet these limitations. It is for these reasons that applicant's invention defines over the prior art of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

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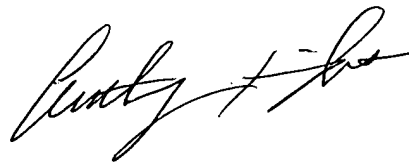
Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner *Thomas Pham*; whose telephone number is (571) 272-3689, Monday to Thursday from 6:30 AM - 5:00 PM EST or contact Supervisor *Mr. Anthony Knight* at (571) 272-3687.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

**Thomas Pham**  
*Patent Examiner*



August 15, 2005



**Anthony Knight**  
**Supervisory Patent Examiner**  
**Group 3600**